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work equal to 1% of the unfinished work at the close of the day before. At the completion of all the work the \$300 were divided between A and B in proportion to the amount of the work each had performed.

Required—(1) The number of days to do the work; (2) on which day would the daily earnings of A and B be the same; and (3) the amount of money each was paid under the agreement.

344. Proposed by V. M. SPUNAR, Cleveland, Ohio.

Given  $x^7 - 5x^2y^4 = -1506\dots(1)$ , and  $y^5 - 3xy = 103\dots(2)$ ; find the values of  $x$  and  $y$ .

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### GEOMETRY.

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374. Proposed by PROF. R. C. ARCHIBALD, Brown University.

The locus of the middle points of chords, of a conic, which all pass through a fixed point  $P$ , is a conic. In general, four chords equal to a given length  $K$  can be drawn through  $P$ . Show that the middle points of these equal chords lie on a circle whose center is independent of  $K$ .

375. Proposed by C. N. SCHMALL, New York City.

From a point  $P$  on a circle there are drawn three chords  $PA$ ,  $PB$ ,  $PC$ . Show that the circles described on these chords as diameters intersect again in three collinear points.

376. Proposed by S. LEFSEHETZ, East Pittsburg, Pa.

Inscribe in a given circle a quadrilateral, having given the three diagonals.

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### CALCULUS.

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300. Proposed by E. B. ESCOTT, University of Michigan, Ann Arbor, Mich.

Solve the differential equation obtaining the complete primitive:  
 $(x^2 + x^2y + 2xy - y^2 - y^3)dx + (y^2 + xy^2 + 2xy - x - x^3)dy = 0.$

301. Proposed by C. N. SCHMALL, New York City.

Show that the volume of the surface,

$$\left(\frac{x}{a}\right)^{\frac{2}{3}} + \left(\frac{y}{b}\right)^{\frac{2}{3}} + \left(\frac{z}{c}\right)^{\frac{2}{3}} = 1, \text{ is } \frac{100 \pi abc}{3.7.11.13}.$$

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### BOOKS AND PERIODICALS.

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*College Algebra.* By Schuyler C. Davidson, Sc. D., Professor of Mathematics in Indiana University. 8vo. Cloth sides and leather back, xiv+243 pp. Price, \$1.50 net. New York: The Macmillan Co.

This book, we are told in the preface, is not written for the mathematician but for students wishing to know the elements of ordinary algebra. For this reason, the book is

not exhaustive, many subjects belonging to a treatise on Algebra being omitted. The first chapter deals with the natural number system and the second with rational numbers. The discussion carried on in these two chapters is admirable, but is, in our judgment, unintelligible to the average teacher into whose hands the book is intended to fall. However, much good may be done for this class of teachers by putting before them something lying outside the familiar path of their limited experience.

A sufficient number of problems are given to illustrate the underlying theory. The book will prove serviceable in classes whose previous preparation has been satisfactory. F.

*Wentworth's Plane Geometry.* Revised by David Eugene Smith. 8vo. Cloth, vi+287 pages. Price, 80 cents. Boston and Chicago: Ginn & Co.

This book is a revision of Wentworth's Plane Geometry, and has many points of superiority over the earlier editions. For example, in the introduction emphasis is laid on the instruments of geometry and practical exercises are given. The book closes with an article on geometric recreations and one on the history of geometry. F.

*A Text-Book on Advanced Algebra and Trigonometry With Tables.* By William Charles Brenke, Ph. D., Associate Professor of Mathematics in the University of Nebraska. 8vo. Cloth, vii+345 pages. Price, \$2.00. New York: The Century Co.

The author of this book believes that the presentation of the two subjects, Algebra and Trigonometry, in a correlated manner, is more satisfactory than to take up the two subjects alternately. For that reason he has written this text. In it are to be found a fairly complete treatment of the ordinary subjects usually studied in the earlier part of a mathematical course. An introduction to the Differential Calculus is also inserted by making use of the derivative. To those teachers who share the author's belief, the book will be found serviceable. F.

*Lectures on the Theory of Elliptic Functions.* By Harris Hancock, Ph. D. (Berlin), Dr. Sc. (Paris), Professor of Mathematics in the University of Cincinnati. Vol. 1 Analysis. First Edition. First Thousand. Large 8vo. Cloth, xiii+498 pages, 76 figures. Price, \$5.00. New York: John Wiley & Sons.

This is by far the most exhaustive and scholarly work that has thus far been published on this subject in America. It is the purpose of the author to present the Theory of Elliptic Functions in three volumes, which are to include the three following phases of the subject, viz: Vol. I, *Analysis*; Vol. II, *Applications to Problems in Geometry and Mechanics*; and Vol. III, *General Arithmetic and Higher Algebra*. In the development of the subject, the author places the Theory of Weierstrass side by side with the Theory of the older writers and many of the formulæ derived by him are contrasted with the corresponding formulæ of the earlier writers. The general theory is treated by means of Riemann surfaces, thus showing the intimate relations between the theory of Weierstrass and his predecessors.

It is to be hoped that the author will soon present the other two volumes to the American mathematicians, who are already greatly indebted to him for this first volume. F.

*The Monist* for July contains three important mathematical articles. The first is Mathematical Creation, by Henri Poincare; the second, The Construction of Magic Squares and Rectangles by the Method of "Complementary Differences," by W. S. Andrews; the third, Magic Circles and Spheres, by Harry A. Sayles.

*Practical Algebra*, First Year Course. By Joseph V. Collins, Professor of Mathematics, State Normal School, Stevens Point, Wisconsin. 8vo. Cloth, 301 pages. Price, \$1.00. New York and Chicago: The American Book Co.

This book is an abridgment of the author's *Practical Algebra* which appeared two years ago and which was noticed in the *Monthly* at that time. Human interest is added to this text by the insertion of portraits of Newton and Descartes. F.

*Shop Problems in Mathematics*. By William E. Breckenridge, Chairman of the Department of Mathematics, Samuel F. Mersereau, Chairman of the Department of Woodworking, and Charles F. Moore, Chairman of the Department of Metal Working, in Stuyvesant High School, New York City. Cloth, 12mo, 280 pages, illustrated. Price, \$1.00. Boston, New York, Chicago: Ginn & Co.

"This book aims to give a thorough training in the mathematical operations that are useful in shop practice, e. g. in Carpentry, Pattern-Making, Foundry Work, Forging, and Machine Work, and, at the same time, to impart to the student much information in regard to shops and shop materials. The mathematical scope varies from addition of fractions to natural trigonometric functions. Problems are graded from simple work in board measure to the more difficult exercises of the machine shop. All problems are based on actual experience. The slide rule is treated at length. Short methods and checks are emphasized. The book should be useful in any schools where there are shops: i. e. in the upper grades of elementary schools for a review course in Practical Mathematics; in Manual Training High Schools as a supplementary book of problems all through the mathematical course and in the shops; in Trade Schools as a text-book either in the mathematics classroom or in the shop; in Normal Schools; in Apprentice Schools, and in the classes of the Y. M. C. A."

*Theoretical Mechanics*. By Percy F. Smith, Professor of Mathematics in the Sheffield Scientific School, Yale University, and William Raymond Longley, Assistant Professor of Mathematics in the Sheffield Scientific School, Yale University. 8vo. Cloth, 288 pages. List price, \$2.50. New York and Chicago: Ginn & Co.

This book is intended for use in courses in mechanics which, as in many colleges and technical schools, are based upon the calculus. For the convenience of the student, formulas from analytic geometry and the calculus, and a table of integrals, are included. The first chapter deals with centers of gravity and moments of inertia. This is followed by chapters on kinematics and kinetics of a particle (including impact), motion in various fields of force (constant field, central field, harmonic field), kinetics of a system of particles, potential, motion in a resisting medium, dynamics of a rigid body, including uniplanar motion, and equilibrium of coplanar forces.

Attention is called to the following special features of the book: 1. The fundamental problem—to determine the motion due to a given force under given initial conditions—is thoroughly discussed. The equations of motion obtained by integration of the force equations have, however, been studied in a previous chapter, and the student is therefore cognizant immediately of the significance of his results. 2. Emphasis is laid everywhere in the solution of problems upon the general application of the force equations, the energy equation, and the impulse equation. 3. The problems are carefully selected, and numerous illustrative examples are worked out in the text.